

What is claimed is:

1. A printing machine which includes an ink reservoir, an ink supply  
source, and one or more ink delivery tubings each connecting said ink  
5 reservoir to said ink supply source, whereby the ink supplied from  
said ink supply source via at least one of said ink delivery tubings  
to said ink reservoir and accumulated therein is used for printing,

wherein the printing machine further comprises one or more ink  
removing means for removing said ink remaining in said ink delivery  
10 tubings,

each of said one or more ink removing means includes respective  
air supply means which supply a fast enough flow rate and/or a large  
enough flow volume of air into said ink delivery tubings such that  
the air flows toward said ink supply source in the direction away from  
15 said ink reservoir in order to remove said ink remaining on the inner  
surface of said ink delivery tubings.

2. The printing machine according to Claim 1, further comprising one  
or more ink transfer means for transferring said ink between said ink  
reservoir and said ink supply source via at least one of said ink  
20 delivery tubings,

wherein each of said ink transfer means transfers said ink via  
said ink delivery tubings before and during the printing operation  
of the printing machine, while said ink transfer means moves air in  
said ink delivery tubings after a printing operation thereof has  
25 finished.

3. The printing machine according to Claim 1, wherein said ink  
removing means further includes at least one diluting liquid supply

means which supply liquid in said ink delivery tubings such that the liquid flows toward said ink supply source from said ink reservoir in order to dilute said ink remaining therein.

5 4. The printing machine according to Claim 2, wherein said ink removing means further includes at least one of viscometer for detecting the viscosity of said ink being removed from said ink delivery tubings, and at least one adjusting means for adjusting the amount of diluting liquid supplied by said diluting liquid supply  
10 means in response to the viscosity detected by said viscometer.

5. The printing machine according to Claim 2, wherein each of said air supply means comprises air flow tubings connected to be in fluid communication with said respective ink delivery tubings in close proximity to opening ends thereof adjacent to said ink supply source,  
15 and air suction means disposed within said air flow tubings for sucking air down from said ink delivery tubings by virtue of air flow passing through said air flow tubings.

6. The printing machine according to any one of Claims 1 to 3, wherein each of said air supply means comprises air/gas introduction means  
20 which introduces air/gas into said ink delivery tubings in close proximity to the opening ends thereof adjacent to said ink supply source.

7. The printing machine according to Claim 2, wherein said diluting liquid supply means comprises diluting liquid tubings connected to  
25 be in fluid communication with said respective ink delivery tubings in close proximity to the opening ends thereof adjacent to said ink reservoir, and a diluting liquid source connected to said diluting liquid tubings, respectively.

8. The printing machine according to Claim 1, wherein said ink delivery tubing comprises one or more ink supply tubings for supplying said ink from said ink supply source to said ink reservoir, and one or more ink recovery tubings for recovering said ink from said ink reservoir and returning it back to said ink supply source,

said ink supply tubings and/or said ink recovery tubings include ink transfer means which can transfer said ink in between said ink supply source and said ink reservoir and vice versa,

whereby said ink supply tubings can operate as ink recovery tubings and/or said ink recovery tubings can operate as ink supply tubings.

9. The printing machine according to Claim 1, wherein said ink reservoir is formed by an inking roller which applies said ink to a printing die, an ink squeezing member extending along the axis of said inking roller in contact with the same for the adjustment of the amount of said ink being applied to the printing die, and a pair of diaphragms or dam plates disposed at common end extremities of said inking roller and said ink squeezing member,

comprising one or more driving means which move said opening ends of at least one of said ink delivery tubings adjacent to said ink reservoir along said axis of the inking roller.

10. A method for supplying/recovering ink wherein said ink is supplied and/or recovered via at least one of ink delivery tubings connected between an ink reservoir and an ink supply source,

wherein the method includes the step of supplying a fast enough flow rate and/or strong enough flow volume of air into said ink delivery tubings so that the air flows toward said ink supply source in the direction away from said ink reservoir, and the step of

supplying a diluting liquid in said ink delivery tubings intermittently such that the liquid flows toward said ink supply source from said ink reservoir, wherein both of said supplying steps occur simultaneously in order to recover said ink remaining on the  
5 inner surface of said ink delivery tubings.

11. The method according to Claim 10, wherein the method further includes the step of detecting the viscosity of said ink being removed from said ink delivery tubings, and the step of adjusting the amount of said diluting liquid in response to the viscosity detected by said  
10 step of detecting.

12. An apparatus for removing and/or recovering ink remaining in one or more ink delivery tubings connecting an ink reservoir to an ink supply source,

wherein the apparatus includes air supply means which supplies  
15 a fast enough flow rate and/or strong enough flow volume of air into said ink delivery tubings such that the air flows toward said ink supply source in the direction away from said ink reservoir in order to remove said ink remaining on the inner surface of said ink delivery tubings.

20 13. A preparation method for changing printing color, wherein the printing machine used for the method comprises an ink reservoir being formed by an inking roller which applies said ink to a printing die and an ink squeezing member extending along the axis of said inking roller in contact with the same for adjustment of the amount of said  
25 ink being applied to the printing die,

an ink supply source for supplying ink to said ink reservoir, and  
one or more ink delivery tubings each connecting said ink reservoir to said ink supply source, whereby the ink supplied from

said ink supply source via at least one of said ink delivery tubings to said ink reservoir and accumulated therein is used for printing, and thereafter the printing color is changed by replacing said ink supply source for a successive printing step using a different color,

5       the method comprising the step of supplying said ink from said ink supply source to said ink reservoir via at least two of said ink delivery tubings,

          using at least one of said ink delivery tubings for supplying said ink from said ink supply source to said ink reservoir, while using  
10       at least one of the other of said ink delivery tubings for recovering said ink from said ink reservoir and returning it back to said ink supply source, whereby said ink is circulated between said ink supply source and said ink reservoir, and said ink accumulated in said ink reservoir is used for printing,

15       using all of said ink delivery tubings in order to recover said ink from said ink reservoir and return it back to said ink supply source, while at the same time rotating said inking roller, so that remaining ink in said ink reservoir is recovered and returned back to said ink supply source,

20       supplying a diluting liquid onto the surface of said inking roll, thereby removing or rinsing out said ink from the surface thereof,

          recovering said ink from said ink delivery tubings and returning it back to said ink supply source, by supplying a fast enough flow rate and/or strong enough flow volume of air into said at least two  
25       of ink delivery tubings such that the air flows toward said ink supply source in the direction away from said ink reservoir,

          replacing said ink supply source in which remaining ink has been recovered therein with an ink supply source of another color.